Coral reefs – NIO's repopulating experiments

Suman D. Gad

Coral reefs are the most biologically productive of all natural communities. Corals are members of a group known as coelenterates or Cnidarians. The several thousand types are diverse in colour and variety, from the sea fans and feathers to small hydroids, from fleshy sea anemones to glassy jellyfish.

Coral reefs worldwide are under serious decline owing primarily to over harvesting[1,2], pollution[3,4], disease[5] and climate change[6,7].

In many locations around the world, human-induced stress to coral reef has exceeded their regenerative capacity, causing dramatic shifts in species composition and resulting in severe economic loss[8].

In the absence of severe human impacts, reefs readily reassemble after routine disturbances such as tropical hurricanes[9]. However, many contemporary coral reefs increasingly fail to regenerate after natural and human impacts and instead have undergone a rapid shift to an alternate state[10,11].

The use of dynamite to kill great masses of fish and of bleach to flush them from their hiding places has become a widespread, distinctive practice.

The National Institute of Oceanography, Goa has conducted several experiments for repopulating damaged coral reef areas of Lakshadweep (M. Wafar, pers. commun.). The reefs of Lakshadweep in the past have faced impacts of coral mining, coral collection, groundwater pollution and mechanical damages due to dredging (M. Wafar, pers. commun.).

Nearly five decades ago, Lakshadweep reefs had fairly good live coral cover with large diversity of corals (M. Wafar, pers. commun.). Since 1998, massive bleaching has drastically reduced the live coral cover killing many coral species; some reefs have also became 'coral graveyards'. The Ministry of Environment and Forests, Government of India started the Indian Coral Reef Monitoring Network. Wafar developed techniques for coral regeneration and their application in restoration of island ecosystems. He realized that conservation would be possible only with the support and involvement of local population. Competence in SCUBA diving was the most essential part of the project, as the corals are distributed below the water surface, down to 50 m depth. A diving centre was developed in Lakshadweep, training a broad spectrum of stakeholders ranging from officers, wardens, scientific staff to unemployed youth from all ten islands of the region. Wafar was also successful in the creation of a community team that is competent to monitor its own ecosystem on a regular basis and report damages to the investigator.

The current initiative is transplantation of corals to repopulate damaged coral-reef areas. The advantage of transplantation is that there is control over the choice of species and the technique is cost-effective, with no skilled labour required. Some of the coral species transplanted in Kavaratti Lagoon include *Acropora formosa*, *Acropora* sp. 1, *Acropora* sp. 2 and *Pocillopora damicornis*. During the last two years the technique has been tested and found suitable. This process is now being transferred to a community-based exercise in all islands, so that reef restoration is enhanced and additional

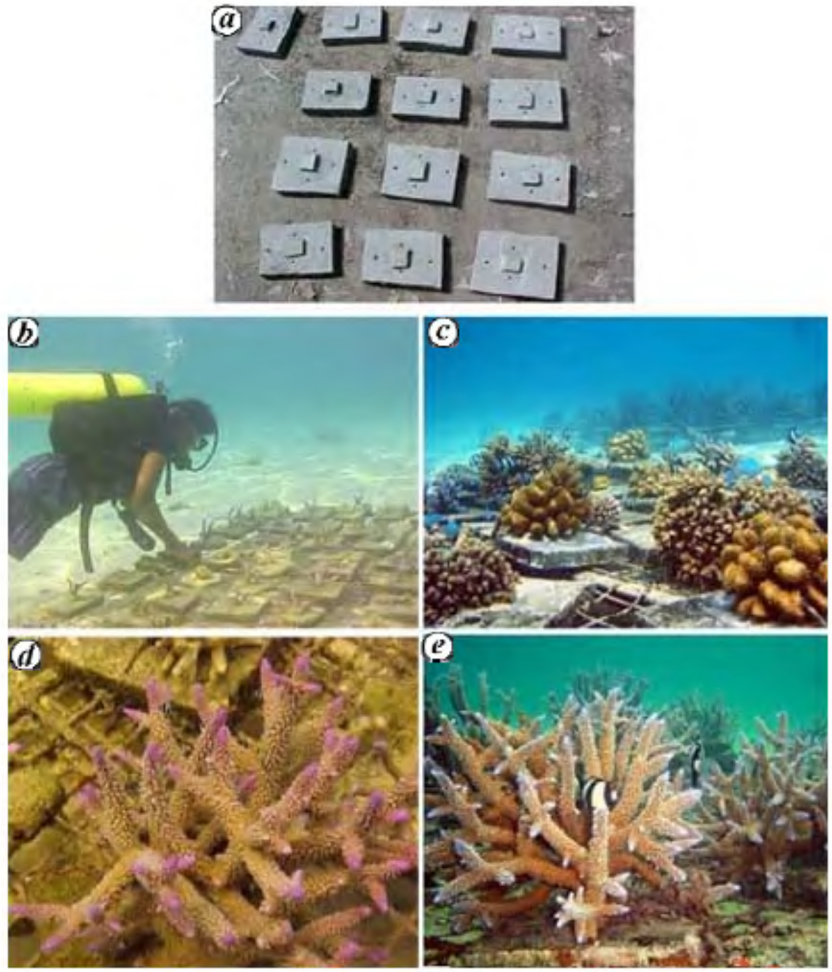

Figure 1. Different steps of growth of corals on artificial substratum. ***a***, Cement blocks – the hard substrate for growing corals. ***b***, Corals grown on artificial substratum (December 2004). ***c***, ***d***, Growth phase of corals: ***c***, April 2006 and ***d***, October 2005. ***e***, Frames overgrown with corals to be transplanted to natural reef habitat (December 2007). Photos credit: Dr M. Wafar, NIO, Goa.

income generated for the local population by way of fish catch from near the transplantation site.

The project that began in 2000, has made a noticeable impact on the local population of Lakshadweep and the coral reefs. Till date, around 30–40 locals from Kavaratti and Agatti have been trained in coral reef monitoring and 12 locals in coral identification. The project team has recorded more than 100 species belonging to 41 genera from Kavaratti and Agatti reefs of Lakshadweep (Figure 1).

In future Wafar plans to increase the area covered by transplants and extend it to other lagoons and reefs. He also plans to record 200 more species from other reefs, and transform this experiment to a community-based exercise.

Coral reefs worldwide are in need of protection. Man once lived in relative harmony with coral communities. But today his ill-conceived constructions could turn coral castles into an archaeological tomb.

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ACKNOWLEDGEMENT. I thank Dr M. Wafar, NIO, Goa for valuable inputs and photographs on corals.

Suman D. Gad (S. Ramaseshan Fellow), c/o Vedpal Tari, D-3/F, General Pool, Govt Quarters, Altinho-Panaji, Goa 403 001, India.
e-mail: sumangad@rediffmail.com

MEETINGS/SYMPOSIA/SEMINARS

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Contact: Mr P. Panneerselvam
Organizing Secretary – KNICT 09
B. S. Abdur Rahman Crescent Engineering College
GST Road, Vandalur
Chennai 600 048, India
Tel: +91-44-22751347/348/350/375
Fax: +91-44-22750520
Mobile: +91-9841103912
E-mail: knict_crescentlib@crescentcollege.org

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Contact: Dr N. Udupa
Principal
Manipal College of Pharmaceutical Sciences
Manipal 576 104, India
Tel: +91-820-2922482, 2922433
Fax: +91-820-2571998
E-mail: cpe.mcops@manipal.edu